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ABSTRACT

The University of Utah in building a planning, programming, and budgeting system has developed an analytical measurement called enrichment analysis that has proved useful in focusing faculty and administration attention during budget setting on long-range planning, objectives and outputs. Enrichment analysis shows not only the rate of increase in cost per student by department and program, but how resources were allocated within programs. Use of the analysis in budget setting has encouraged a hard review of objectives and output in relationship to historical and projected costs. As a result of these reviews, resources have been freed for special enrichment, objectives have been revised, and better planning/programming has been initiated. The paper briefly describes the development of the analysis and data requirements. The major thrust of the paper is on the use of enrichment analysis to encourage rigorous planning and beter allocation of resources. An overview of various emphases in planning is included in the report. (Author/HS)

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By Loyd D. Andrew, University of Utah

The University of Utah in building a planning, programming, and budgeting system has developed an analytical measurement called "enrichment analysis," that has proved useful in focusing faculty and administration attention during budget setting on long range planning, objectives, and outputs.

Enrichment analysis shows not only the rate of increase in cost per student by department and program, but how resources were allocated within programs -- faculty salary, students/faculty, and support to meet department and university objectives. Use of the analysis in budget setting (slightly in 1971 and extensively in 1972) has encouraged a hard review of objectives and output in relationship to historical and projected costs. As a result of these reviews, resources have been freed for special enrichment, objectives have been revised, and better planning/programming has been initiated.

The paper briefly describes the development of the analysis and data requirements. The major thrust of the paper is on the use of enrichment analysis to encourage rigorous planning and better allocation of resources. An overview of various emphasis in planning is included in the report.

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By Loyd D. Andrew, University of Utah

Presented at the recent Conference of the California Association for Institutional Research, February 27 - March 2, 1973

ENRICHMENT ANALYSIS - A TECHNIQUE FOR ENCOURAGING BETTER PLANNING AND BETTER USE OF RESOURCES

By Loyd D. Andrew, University of Utah

There are many ways to go about planning, but three approaches appear fairly basic. One way, and I suspect the most common in public administration, whether it be higher education, welfare or defense, is to assess needs, look at your existing organization, and then to develop a plan that justifies more resources for meeting projected needs. In reviewing budgeting efforts at several institutions, both directly and indirectly, I suspect that the simplistic approach shown in Figure 1a has been uncommonly common. This type of planning can be as simplistic as taking one's existing budget, adding 5% for inflationary increases, another 5% or 10% for workload changes, and then another 10% for the reviewing agency to cut out so that it can make a public announcement that the budget was slashed 10%.

A variation of this (shown in Figure 1b) is considerably more complex. In this approach considerable time is placed on determining needs. There are elaborate surveys, sophisticated methods of projecting enrollment are used; intelligence networks are designed; and, on occasion, each department of the organization is asked to provide information on needs as they see them. In this approach, the emphasis is on evaluation of the external environment rather than the internal one unless we are very sophisticated. If the approach is reasonably sophisticated, we probably use some form of planning, programming and budgeting (or system analysis) to balance program needs with resources. In which case we may develp the soundest or in the vernacular of the trade, what is the most cost effective method of meeting objectives and we may drop or change certain objectives. The range of sophistication is extremely large, but the reality of the data that we use in these studies is very suspect, not only in education

where we admit readily to ignorance regarding the measurement of outputs and what really causes the magic of university education to occur, but in all public administration. It is worth noting that most surveys indicate that planning at this level is very rare.

Another approach to planning is to evaluate how we are using our current resources to meet needs -- this approach (depicted as performance evaluated in Figure 1b) is usually not thought of as planning. In fact this type of analysis is only seldom lodged in either the planning or budgeting office. Normally it is found in the controller's operation. The emphasis here is on efficiency -- how can we get more work done for less dollars? It's worse case application is the old efficiency expert with a stopwatch. The approach seems to have as a basic tenet that man is naturally larcenous. Thus, there is a lot of emphasis on accountability, maintaining logs, and designing audit trails. In this approach, the question about the value of the work is seldom raised. It's taken as given that work is valuable and that production in an efficient way is sufficient. It may be that this type of analysis is seldom lodged in a planning or budgeting office in fear that a "planning-type" might ask why the work was being done. In other words he might apply the concept of weighing benefits.

There is a third approach to planning that is, in a sense, a combination of the latter two approaches, but it is also considerably more.

In this third approach, we as planners, not only look at what needs to be done, but at the best way of doing it. In short, we not only identify needs and do cost benefit analysis, but we look at: (1) what we are doing, (2) how we are using our resources to do those things, (3) whether we really want to do those things; and (4) whether we are doing them in the most effective and efficient manner. If we are very bright, we probably assume as a tenet that man is not inherently a larcenist but that he likes doing something worthwhile and probably thinks he is. This approach is illustrated in Figure 1c. You'll

*We did not run complex surveys, but we analyzed career projections in relationship ship to disciplines (this can become somewhat difficult), identified societal needs, and tested community sentiment.

note that I've treated process as an internal resource. This is a somewhat unique concept, but an important one. How we do things - good or bad - is a significant resource that must be used or changed.

At the University of Utah, we took the latter approach to planning at the start of 1970. I believe we took this route somewhat fortuitously because the University had not developed any coherent theory about integrated planning or concentrating on better use of internal resources to do worthwhile activities. Our University is very old and we share with all other public institutions certain ingrained habits and traditions. Previous planning had been outer rather than inner directed. Initially there was considerable dissatisfaction with the emphasis our planning department placed on objective setting and better allocation of existing resources. The emphasis on internal planning won out, we like many others had a legislature that was extremely reluctant to meet inflationary needs, much less new program requirements. Another significant component of our planning in the past few years was our belief that man prefers achievement rather than "make-do" work. We behaved very much according to this philosophy. We had to if we were to face effectively the fact that any new programs had to be developed, using resources now being expended on old programs.

As a result of our emphasis on internal planning we have developed what I hope is some useful analytical tools and, perhaps more important, a process and concept. We had somethings going for us when we started our internal planning efforts: a good working knowledge of systems analysis, close working relationship with what has become NCHEMS at WICHE, (We were one of the pilot schools in the development of RRPM and received some funding for testing it.) and a better than average start on a management information system. However, we did not find much guidance in educational literature on how to do internal

planning or win internal commitment. We had to rely on business experience and literature.

We attacked the problem of internal planning by asking for help from those who would have to implement our plans. We selected one college and four departments to work closely with in a pilot program on planning. We approached deans and department chairmen with what I have labeled a "high ignorance level," sometimes purposely and sometimes accidentally. In our discussions we ignored, or did not admit, the problems of such constraints as faculty tenure, personal goals, precedent or tradition. We come again and again back to the same basic questions: What do you want to do? What does your department want to do? All of these questions were followed by "why", which drove us to looking at the external environment in an uneloquent way.

When the deans and department chairmen sought to justify more money on increasing enrollment or the need to improve student/faculty ratios, we sometimes suggested that they consider restricting enrollment, purposely ignoring the constraint that we are a state university obligated to accepting (to a great extent) the students who knock at the doors.

It wasn't as easy as I am portraying, of course. Deans and department chairmen had a long tradition of justifying budget needs on enrollment projections. They, and our administration, for that matter, were rather strongly convinced that money followed SCH*- not only from the legislature to the university, but from the university administration to the colleges and departments.

It was this argument among others that encouraged us to build what we call "enrichment" analysis as one means of facilitating communication and defining objectives and priorities, not only with the administration but with where it happens - at the faculty and department chairman level.

Credit Hour Production

"Enrichment analysis" is a means of communicating to deans and department chairmen that the administration does not fund, necessarily in relationship to enrollment. Enrichment analysis is not very complex. The basic premise, "cost/student", has been considered since 1911, at least, but never used our way - time. However, in enrichment analysis we measure change in cost per student overtime, first in terms of what we call "university full time equivalent or UFTE. You probably have this type of student in your budget justifications. He is that carefully weighed fellow that makes allowance for the difference in cost levels and departments. For example, graduate student education at the University of Utah costs approximately six times lower division education. Thus a graduate student is counted six times when we develop a cost per UFTE.

Figure 2 shows how we expressed enrichment and the results in one college. We computed the cost per student in 1967, 1970 and 1971, and then determined the annual percentage change in cost. As you can see from the chart, what we call "relative enrichment" has no relationship to enrollment. In this particular college, some departments received as little as 7.5% annual increase on a cost/student basis; another department received as much as 18.2%. The range in the university was even greater - 26% for one college to 1% for another. This type of chart helped us do two extremely important things.

We used it in communicating with the administration. We had some old data in which the administration had indicated its objectives and concerns in terms of student/faculty ratios, funding, and in more generalized statements. By comparing these objectives and concerns with the way they had enriched departments, we helped them retest their objectives and review their own decision processes. In some cases we found that the administration had achieved exactly what it had intended to do. There were cases, however when the administration

had not intended to set enrichment so high or so low.

These charts also helped us convince department chairmen and deans that our "ignorance level" was not quite as high as it seemed to be, i.e., the conventional wisdom that dollars followed enrollment was not entireley true; that there might be more important things than enrollment in obtaining funding. For example, the quality of student turned out, the quality of student accepted, the quality of the research, career placement, and the image the department projected. However, enrichment analysis as shown in Figure 2 was used primarily as an index, a way of getting attention and identifying trouble spots. It also let us test deans on their departmental objectives. For example, two deans claimed in their objective setting, which was done parallel with, but reviewed prior to enrichment analysis, that they treated all their departments equally. Enrichment analysis didn't support this which led to some interesting soul searching on the deans' part. Figure 3 illustrates the analysis we did in terms of how money was being spent - on improving faculty salaries, improving student/faculty ratios, or improving support. As you can see, the bulk of enrichment money between 1966 and 1970 had not gone to improving student/faculty ratios (an old objective), but had been spent for improving the quality of faculty, I hope. The caveat doesn't reflect any question about the quality of faculty, but a reluctance to share the assumption that quality is always a function of price.

We have highlighted the problem with some of the deans and department chairmen regarding the amount of money that has been put into support, pointing out that increasing faculty salaries at the expense of support may be counterproductive.* It is somewhat asinine to have high price faculty doing their own typing or installing their own equipment. We have used this chart in some ways to encourage depart-

* Our academic vice president has pushed some of the deans into spending more money on support.

ment chairmen and deans to think a little bit like our old friend the time and motion study man. Would they do better to have fewer higher priced faculty, but strong support so that the faculty could optimize their productivity?

The third chart that we have used is enrichment by level (Figure 4). Data for this chart is based on our faculty time and effort studies, which Leon has already discussed. We designed this chart for two reasons. (1) We set an objective, thanks in part to public pressure, to improve undergraduate education. There was a rumor about the community that we were sacrificing undergraduates to research and graduate education, which was partly true. This chart has been used to test the priority that deans and department chairmen have given to undergraduate education.

I'd like to emphasize here that the low dollar enrichment for the undergraduate level (which the chart shows) did not and should not lead to an automatic assumption that a dean was underprioritizing undergraduate education. In some cases the low dollars allocated to undergraduate education reflected the Dean's quietly stated objectives to build a strong graduate and upper division program while phasing out lower division work as rapidly as possible. The enrichment analysis not only highlighted the consistency of his behavior with his goals, but raised concern about the congruence between his goals and the University's. We also used the chart as the first step in establishing a dialogue about discrepancy between graduate and undergraduate costs which are more a function of student/faculty ratios rather than equipment. Some writers in administration theory hold that the more intelligent and highly trained a man is, the better he can work on his own. Apparently this isn't true in education since the graduate, who by definition should be better trained than the undergraduate, requires more supervision. There are several possible answers to the problem. There are two practical constraints: The attrition rate (classes tend to get smaller as students drop out as levels get higher, and the better faculty (with notable exceptions)

prefer to work with graduate students rather than undergraduate students.* There may be a third reason: undergraduate education may be so poor that the graduate student, when we suddenly demand quality work, is ill-prepared to do it. I am sure that all of you in this room have known faculty members who have had to help their graduate students write their dissertations, and that this help has included much more than critique of design and conclusions.

At the University of Utah we haven't solved the problem of graduate cost in relationship to undergraduate cost. I hope that we are taking steps towards a solution. This table, I think, will encourage faculty to think about the means for improving undergraduate education. It may not require an improvement in student/faculty ratios, but improvement in quality of faculty, or maybe in the process itself.

You'll note that I said, we hope that it will encourage faculty to determine ways of improving productivity. We have the faculty that are more competent than we are for improving their own productivity, but they do need to be confronted with questions regarding the conventional wisdom.

I promised when I answered your call for a paper that I would say something about our management information system at the University of Utah, and what kind of data we use.

As you can tell, I do not think that the management information system <u>per se</u> is as exciting and has as much potential reward as improving communications. However, I believe that numerical analysis has an important role in the communication process. What we did with enrichment analysis could not have been done as well, certainly not as completely, without the impetus provided by RRPM which encouraged us to build a common data base. We were also fortunate at the University in that we had a strong data processing base from which to build our data base.

* These reasons, of course, do not exclude the generally accepted reason for higher costs at the graduate level - greater sophistication in the learning experiences. These are offered to tease thought.

Our basic data system for our long range planning is depicted in Figure 5. Figure 6 shows the major data sources and storage areas. This system, as I continue to remind our data processing people, is fairly unsophisticated. We are still working at the problem of reducing the handling of data (particularly at the input side), accumulating it for easy access, and ensuring that enrollment data is properly aligned with cost and source of fund information. It is worth mentioning that our system has had enough relative accuracy to support analyses, deans and department chairmen have not been critical of the data, even when the numerical analysis based on the data has cost them resources. They have found more relevant items - such as measures of output - to criticize. This type of criticism has encouraged us to encourage them to develop better statements of goals and measures of output.

FIGURE 1a. AN APPROACH TO PLANNING - PERHAPS MORE COMMON THAN WE'D LIKE TO ADMIT

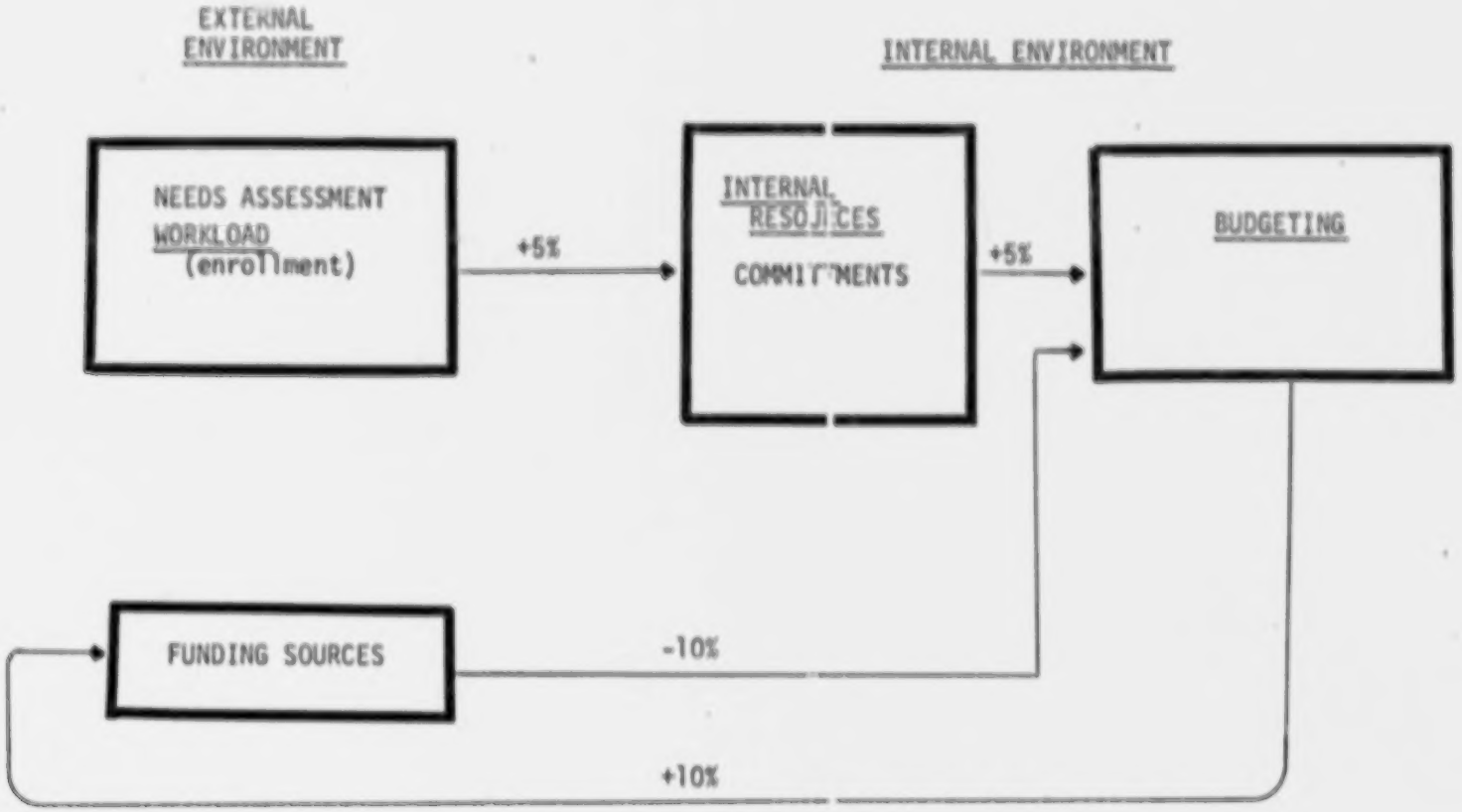


FIGURE 1b. AN BETTER APPROACH TO PLANNING - BUT EMPHASIS ON EXTERNAL NEEDS AND RESOURCES

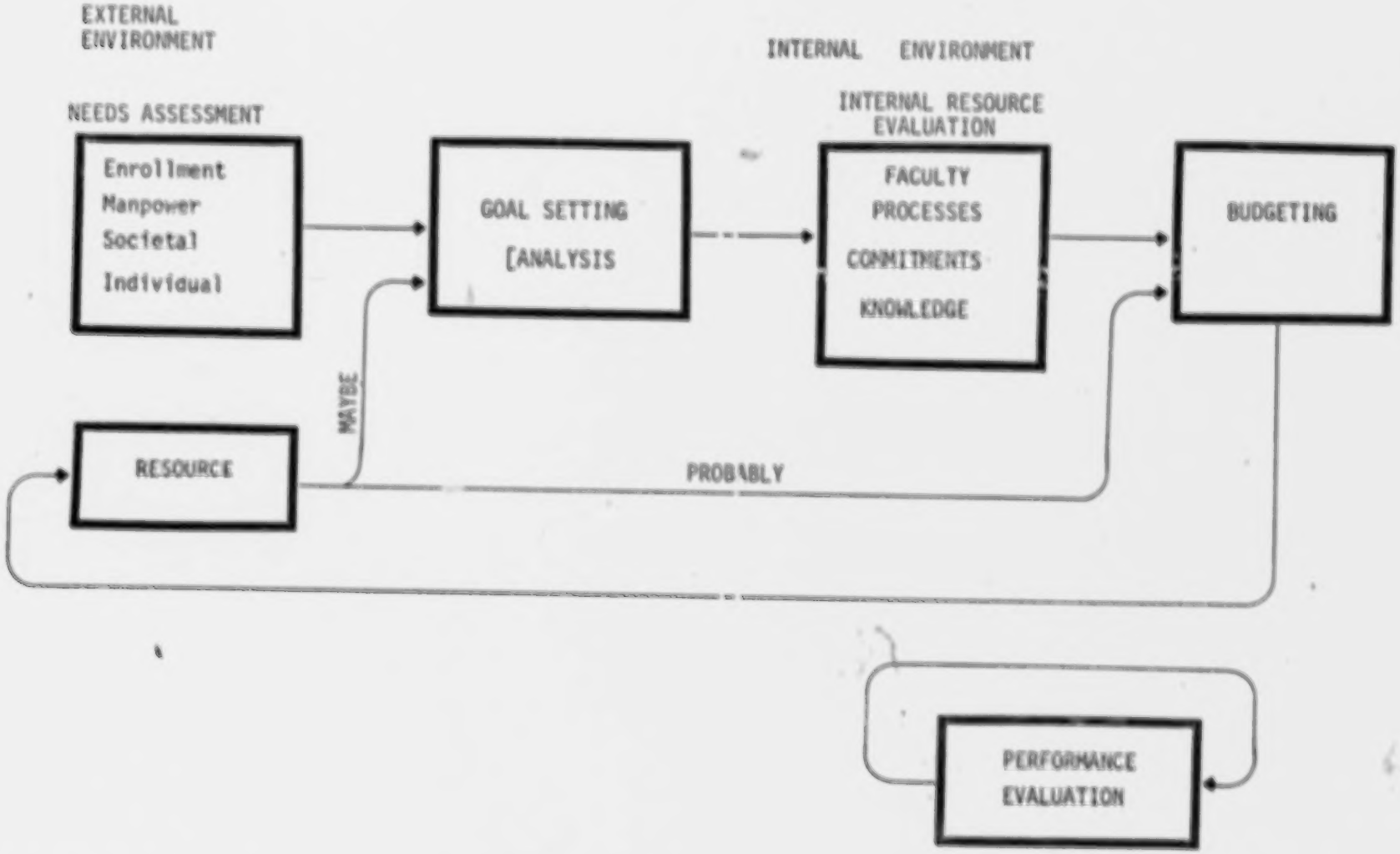


FIGURE 1c. A NECESSARY APPROACH - GIVEN LIMITED PLANNING RESOURCES AND "ZERO-INCREASE" BUDGET

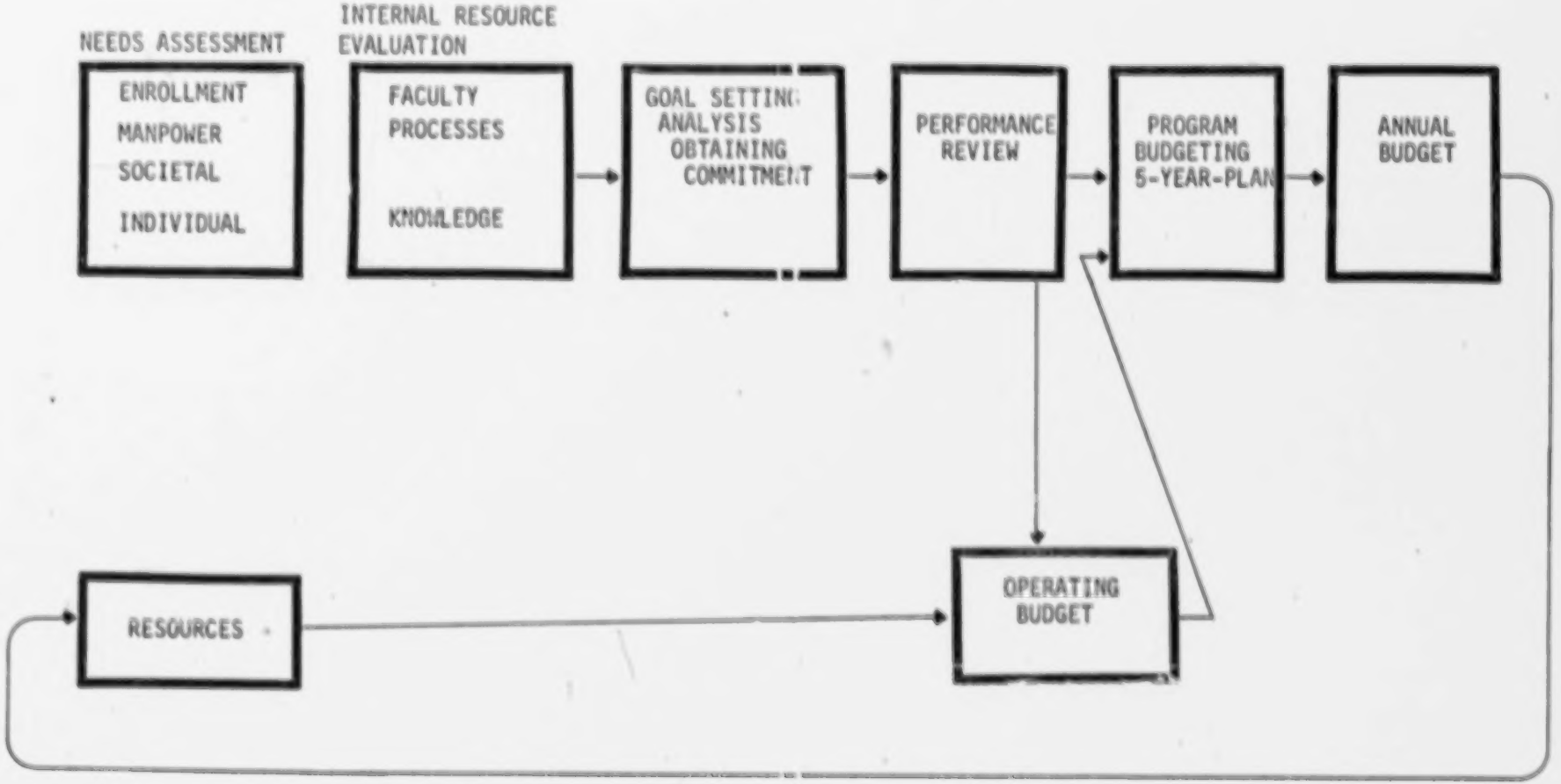


FIGURE 2 - ENRICHMENT ANALYSIS

COST PER WEIGHTED (UFTE) STUDENT

	1966	1970	Relative Enrichment 1966-70	Estimated 1971	Relative Enrichment 1970-71
Department A	220	440	18.2	520	18.8
B	160	300	16.0	380	27.4
C	240	370	12.6	380	2.3
D	150	220	10.0	240	7.0
E	200	280	7.8	340	21.4
F	390	530	7.5	640	21.5
Total College	210	340	13.3	390	15.3

FIGURE 3 - ALLOCATION OF ENRICHMENT RESOURCES --

SALARIES, STUDENT/FACULTY RATIOS, AND SUPPORT

	Dollars Per Student				Percent			
	Enrich.	Stu.-Fac. Ratio	Salary	Support	Enrich.	Stu.-Fac. Ratio	Salary	Support
Department A	82	26	37	18	18.8	31.5	45.9	22.5
Department B	82	48	22	11	27.4	58.0	27.1	13.9
Department C	8	24	-9	-6	2.3	281.4	-111.5	-69.5
Department D	15	8	14	-6	7.0	53.0	88.8	-41.8
Department E	59	-21	69	11	21.3	-35.6	116.4	19.1
Department F	114	44	46	22	21.5	39.1	40.9	19.9
Total College	51	20	23	8	15.2	40.7	46.5	12.6

FIGURE 4 - ENRICHMENT BY LEVEL

	Lower		Upper		Graduate		Relative Enrichment Annual Percentage Change		
	1966	1970	1966	1970	1966	1970	Lower	Upper	Graduate
Department A	290	230	490	1190	1050	2850	-5.6	24.5	28.3
Department B	160	150	450	720	730	2960	-0.6	12.5	41.6
Department C	180	250	840	1110	1200	2220	8.5	7.2	16.7
Department D	147	260	360	430	1020	1570	15.8	4.4	11.2
Department E	180	220	600	564	1021	2630	4.4	-1.7	26.6
Department F	250	220	1420	1060	2600	5800	-3.7	-6.9	22.0

FIGURE 5 - MIS SYSTEM FOR NUMBERICAL GUIDE FOR LONG RANGE PLANNING

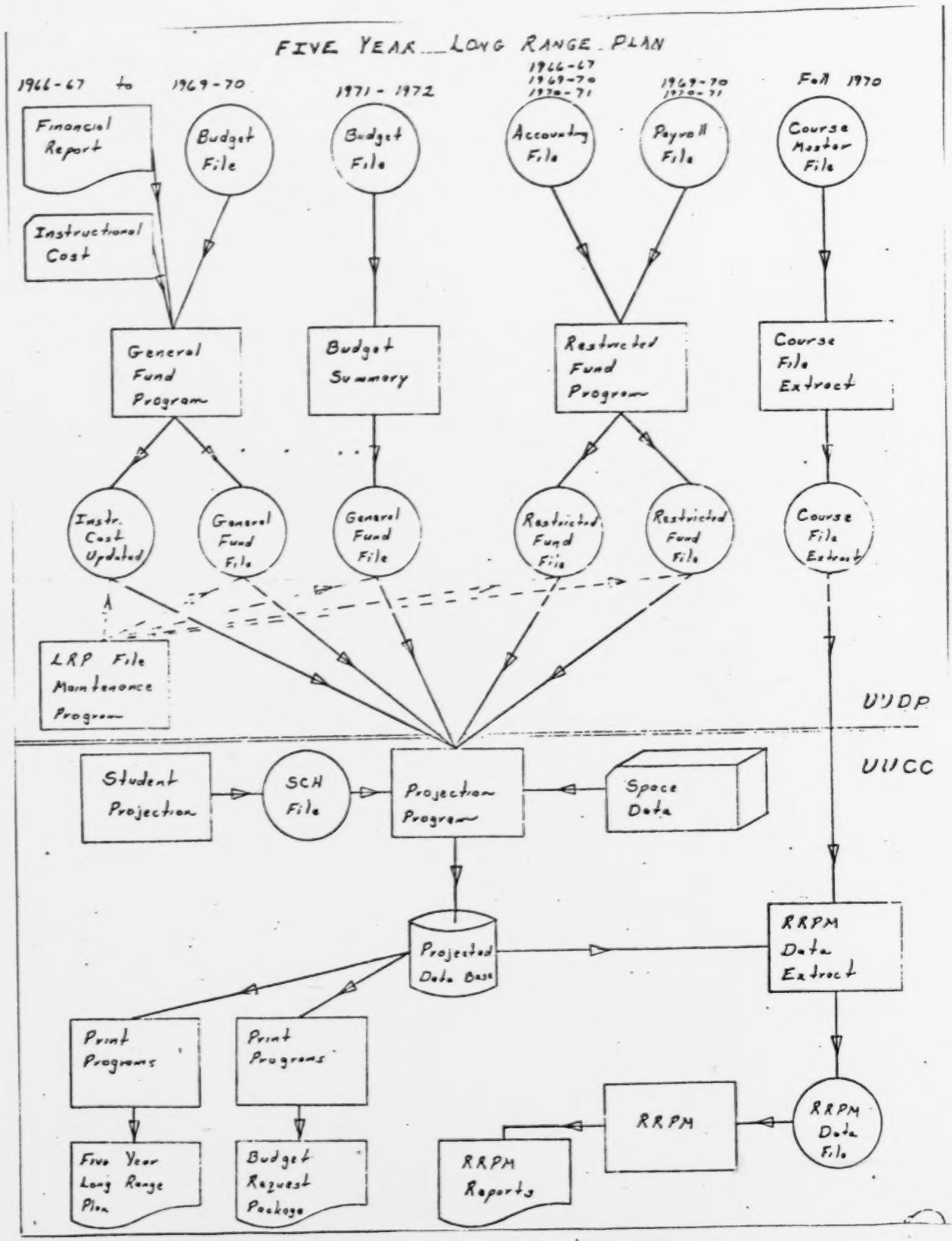
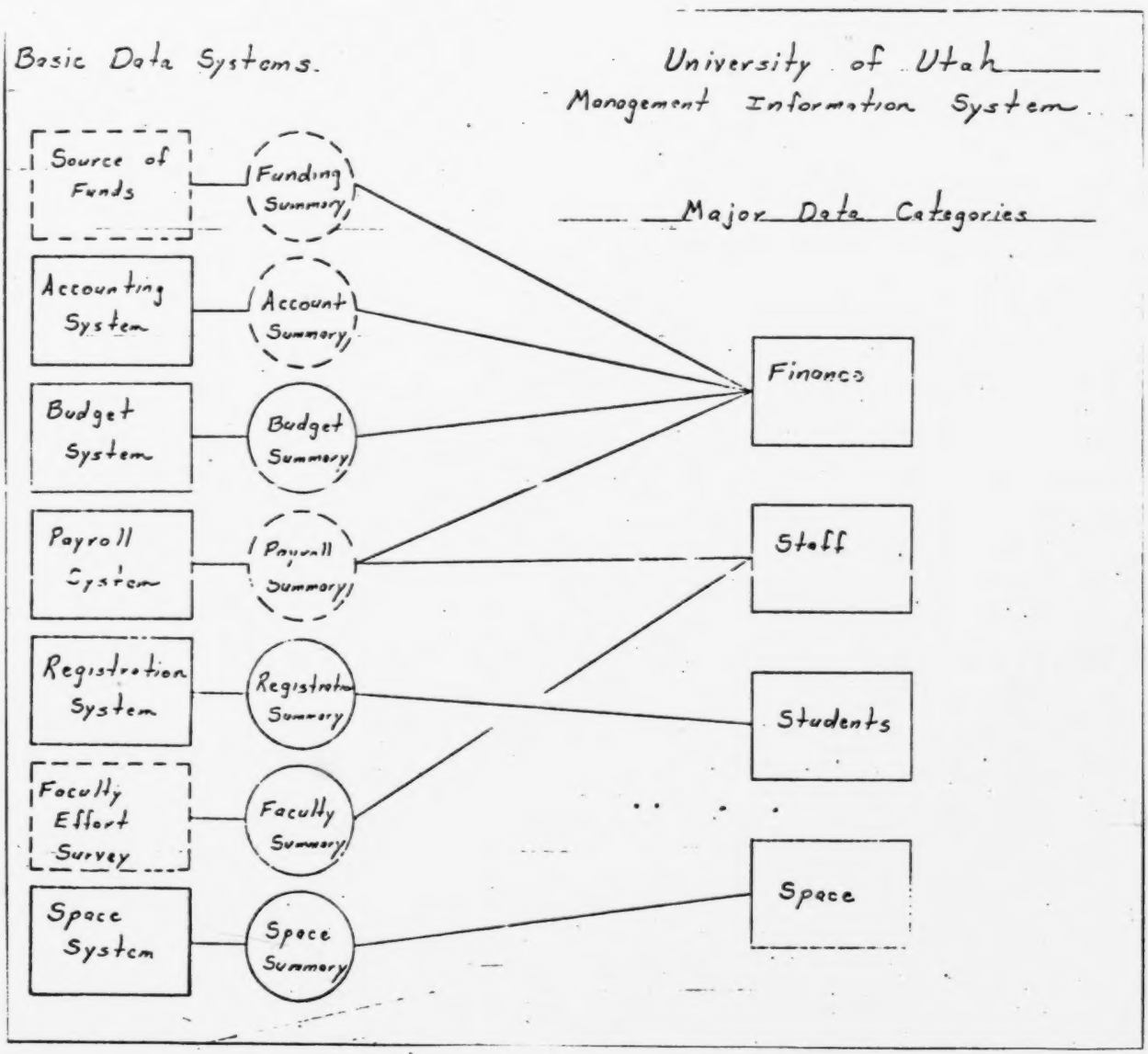


FIGURE 6 - DATA BASE FOR NUMERICAL GUIDE FOR LONG RANGE PLANNING



PPBS IN HIGHER EDUCATION: A CASE STUDY

Loyd D. Andrew and Leon Robertson

Some academic administrators see program budgeting as a panacea to improve internal efficiency and external communication. Others see it as a bureaucratic tool to discourage meaningful education, constrain innovation, and destroy academic freedom. The authors refute some of these misconceptions with their analysis of PPBS and its practical application at the University of Utah.

THE INTRODUCTION of planning, programming, budgeting systems (PPBS) into the management of higher education has been tedious and almost as evolutionary as the development of man.

Implementing PPBS has raised key issues in higher education. Yet, despite criticisms, delay in implementation, and the Pentagon's four-year effort to change emphasis in PPBS and its handmaiden, systems analysis, program budgeting has not lost its magic for administrators and legislatures.

The appeal of PPBS lies in its concept of (1) selecting specific objectives and systematically analyzing, in terms of costs and benefits, various courses of action to attain those objectives—*planning*; (2) deciding on specific courses of action (programs) and providing for review and control—*programming*; and (3) translating planning and programming decisions into specific financial plans—*budgeting*.

Frank B. Dilley has identified higher education's need for a system such as PPBS, which relates "expenditures to results, area by area, department by department." He commented that

> as matters now stand, . . . objectives are not spelled out; sophisticated measures of accomplishment are not generally in use; unit costs are known only vaguely, if at all; and under the pressure of the yearly budget no one has time to plot out alternatives, let alone scrutinize them.[1]

He measured the costs of inadequate planning, programming, and budgeting in such terms as insufficient examination of the status quo with an eye toward creative change, duplicate courses, and decision making at the wrong levels.

In view of Dilley's charges and the attention given to program budgeting, the lack of actual use of PPBS for managerial decisions in institutions seems discouraging until one considers the general progress of the system in government agencies and the full implications for decisions, roles, and organizations.

In 1965, Lyndon B. Johnson, after what he and many respected observers considered the success of PPBS in making some sense out of the Department of Defense, ordered the system implemented in all government departments and agencies. By 1971, at least half of the 50 states had followed federal leadership. However, the decision to insti-

[1] "Program Budgeting in the University Setting," *Educational Record*, Fall 1966, pp. 476–77.

title PPBS has seldom been followed by meaningful action.

Two years after President Johnson ordered PPBS, Charles L. Schultze, then Budget Bureau director, could do no better than report that the use of PPBS was mandatory in 22 agencies and encouraged in 17. He was almost defensive in explaining that PPBS was not the greatest thing since the invention of the wheel, nor was it a

> naïve attempt to quantify and computerize the imponderable, or an arrogant effort on the part of latter-day technocrats to usurp the decision-making function in a political democracy.[2]

In setting these limits, Schultze was being realistic at the same time that he was answering criticisms epitomized by Admiral Hyman Rickover's wry comment in 1966 that "on a cost effectiveness basis, the colonists would not have revolted against King George III."

PPBS implementation

Two studies of PPBS in government provide a standard for measuring implementation. McKinsey and Company, in a study for the Budget Bureau in 1968, found a basic mechanism for PPBS in federal bureaus, but too little analysis submitted too late and reviewed too quickly. In 1969, then Budget Director Robert P. Mayo reported to Congress that

> we are limited . . . by our inability to develop output measures that permit inter-category comparison of benefits.[3]

A Stanford Research Institute study of the Department of State's Foreign Affairs Programming System (FAPS) criticized the system as being non-PPBS in that it had no "trade-offs." There was no way to transfer funds from one mission to another, no way to "crosswalk" FAPS data into budget dollars. The Stanford study noted that FAPS lacked a formal decision-making mechanism.[4]

Practical application

The scanty evidence available indicates that the extent of PPBS implementation in higher education is about equal to or slightly less than that in government agencies. One indication of PPBS implementation is the work being done by the National Center for Higher Education Management Systems (NCHEMS) and eight pilot institutions that tested the implementation of the NCHEMS-designed Resource Requirement Prediction Model (RRPM). This simulation model is not PPBS, but only one of many tools for PPBS and systems analysis. However, it is organized to simulate resource requirements for seven higher education programs.

Of the eight institutions that tested the simulation model, only the University of Utah attempted to apply it to six higher education programs: instruction, research, public service, academic support, student support, and institutional support. The seventh program was not applicable. As a result of this experience with RRPM, NCHEMS has now prepared a simpler model designed to simulate instruction only, a somewhat tactful admission that the budgeting systems of NCHEMS clients are not far along. The progress toward resolving the issues surrounding the measurement of higher education outputs may be a barometer of the progress toward implementing PPBS.

In January 1971, Ben Lawrence, director of NCHEMS, noted that the system was

> making a start toward development of an inventory aimed at identifying the benefits of higher education and suggested possible

[2] "Planning, Programming, Budgeting," testimony before the U.S. Senate, Subcommittee on National Security and International Operations, 23 August 1967.

[3] "Economic Analysis and the Federal Budget," testimony before the U.S. Senate, Joint Economic Committee, Subcommittee on Economy in Government, 25 September 1969.

[4] Quoted in John P. Leacacos, *Fires in the Basket* (Cleveland: World Publishing Co., 1968). See also Frederick C. Mosher and John E. Hair, *Programming Systems and Foreign Affairs Leadership, an Attempted Innovation* (New York: Oxford University Press, 1970).

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> methodologies for measuring specific variables identified within the inventory.[5]

At a training session in July 1972, the NCHEMS staff rather hesitantly outlined some ideas for quantifying outputs, such as student evaluations and job placement at graduation.

Controversy over outputs

The question of outputs is nasty, for outputs or benefits is one side of the cost-benefit equation used as a guide to decide how much in resources is to be devoted to which programs. Unless one can express benefits quantitatively, how can one recommend, much less decide on, a program budget and formalize it at what may be an immediate cost in jobs, in restructured organizations, and in lost missions or objectives?

Higher education is not the only type of institution that has difficulty in defining or measuring outputs. The Department of Defense, which has a better-than-average defined objective and deals, in general, with hard rather than value systems, has not escaped its share of internal quarrels and external criticisms of the amount and value of outputs. The debates of the fifties and sixties over the relative value of airplane vs. carrier vs. ground troops were too well publicized to need recounting.

It is not an oversimplification to say that the overt argument against PPBS and the systems analysis office under Secretary of Defense Robert McNamara was not against cost effectiveness itself, but over concern about the relative and absolute effectiveness or value of outputs.

How measurable inputs and outputs must be before PPBS and systems analysis can be effective is controversial. Charles Hitch noted, four years after PPBS was used for some hefty decision making in the Penta gon, that the costing system underestimated development and production by 100–900 percent, and that the accounting system did not directly yield operating costs by program element.[6]

Harry Keller, in describing the development and history of PPBS in 1968, noted that

> in its ultimate application, program budgeting employs physical measures and ratios reflecting resource utilization in all operating organizations where the cost of obtaining the desired data does not exceed the program benefits to management. . . . [T]he possible adoption of program budgeting in individual departments should not be abandoned because of the lack of existing data on physical measures.[7]

However, the major criteria he sets for PPBS are not the measuring of inputs or outputs physically or precisely but rather comparing alternative methods of pursuing an imperfectly determined policy objective; analyzing alternative ways to accomplish objectives; seeing the complementary relationships among programs or subprograms; allowing for overlapping structures where objectives call for them; and planning total cost.

A modest beginning

The last criterion may be the most rewarding and easiest accomplished in the early stages of PPBS in public institutions. Charles Sturtz noted that the easiest way to start a program is to suggest that the desired activity can be accomplished

> with one man, a desk and telephone, and some travel money! . . . [S]ome of our largest governmental services today emerged from this beginning.[8]

Overemphasis on quantitative data may partially explain the slow development of PPBS in higher education.

Oliver Bryk, reviewing the application of PPBS at state and local levels, was less concerned with measuring inputs and outputs than with other elements of analysis. In his view the major problems of analysis are

[5] *Inventory of Educational Outcomes and Activities* (Boulder, Colo.: Western Interstate Commission for Higher Education, 1971).

[6] "Retrospect and Prospect," excerpts from H. Rowan Gaither Lectures in System Science, University of California at Berkeley, 5–9 April 1965.

[7] *Development and History of the Concept of PPBS* (Detroit: Wayne State University, 1968).

[8] *The Difference Between Conventional Budgeting and PPB* (Detroit: Wayne State University, 1968).

(1) understanding how decisions are made in the organization, noting that what may be a perfectly reasonable subject for analysis to the analyst may be "interpreted as an attack on the system by the system"; (2) selecting the proper level of sophistication in techniques or presentation; and (3) not overspending for precision.

> Conceptual correctness, completeness, and timeliness are usually more important than detail. Using more than three significant digits rarely adds to the value of the information but increases work and chances of error.[9]

Using imprecise measurement and the lack of acceptable definitions of output as an excuse to avoid planning and control in higher education is not new. Complaints about the matter have been the subject of countless reports and studies since the 1890s. Edwin B. Stevens, a special investigator for the American Council on Education in 1925, complained that the

> tendency to emphasize the intangible values of higher education is largely responsible for the fact that there has been a lagging behind on the accounting side of the management and operation of the institutions.[10]

Organizational problems

The problems of output measurement and input cost in the Department of Defense did not provide an excuse for Charles Hitch in 1961 when he proposed PPBS and optimistically asked for a schedule of one to two years to work it out. He received six months and delivered an operational system in time for the Fiscal Year 1963 budget review. The cost was high, not only in dollars, but also in damaged feelings, acceptance, and, some critics would claim, in mission objectives. In looking back at the critics of PPBS, Hitch noted that much of the criticism directed against cost-effectiveness studies or systems analysis was really related to specific decisions that were unpopular with an individual.[11] Enthoven noted that critical comments that systems analysis placed too much emphasis on cost most frequently came from advocates of costly (in terms of cost per unit of effectiveness) or cherished programs.[12]

Perhaps the delay in instituting PPBS in higher education, as well as in government agencies, has not been a matter of technique in identifying costs per unit, setting objectives, or defining and measuring outputs, but a matter of basic rationale of PPBS which, with the euphemisms boiled out, means comparing the effectiveness of one program with another and determining which program shall receive the majority, if not all, of the available resources.

PPBS at Utah

The University of Utah, in reinstituting planning in 1970, was confronted with these serious questions about impact on the cohesiveness and morale of the organization; cost effectiveness of planning itself; and lack of objectives, measurable output, financial resources for planning, and competent analysts.

Utah is a relatively poor state. It ranks first or second in expenditures per capita for higher education but forty-fourth to forty-sixth in state appropriations per student. The university did not have the one-half to one percent of its overall budget, which Bryk estimates is required, to risk on PPBS. The university also understood the validity of James Farmer's assertation that analysts are a rare resource.[13] Many call themselves planners, but the university has found few experts.

Three factors provided the impetus and encouragement for the University of Utah to attempt the controversial PPBS: (1) Because of the relatively small per-student income of the state, the university had to maximize its educational resources. (2) The institution had in operation a management information system heralded as one of the

[9] *Application of PPB on State and Local Levels* (Detroit: Wayne State University, 1968).
[10] Edwin B. Stevens and Edward Elliott, *Unit Costs of Higher Education* (New York: Macmillan, 1923).
[11] Hitch, "Retrospect."
[12] Alain C. Enthoven, "Systems Analyses in the Pentagon," speech to the Association for Public Program Analyses, U.S. Department of Defense, 26 September 1968.
[13] *Why Planning, Programming, Budgeting Systems for Higher Education?* (Boulder, Colo.: Western Interstate Commission for Higher Education, 1970).

more sophisticated.[14] (3) The university was working closely with the Western Interstate Commission for Higher Education (WICHE), from which it had received a contract as a pilot institution to test RRPM.

The university also had some highly significant human resources. At the reinstitution of planning, its president was James Fletcher, an alumnus of the aerospace industry and now head of the National Aeronautics and Space Administration. He understood program management. The financial vice president was a former businessman who understood and practiced delegation. On the academic side, the provost and the academic vice president wanted better decision-making capabilities, but not at any sacrifice in open relationships with faculty or in innovation. The university also had two analysts, a systems programmer, and a budget director who did not see planning as a threat.

Planning goals

In setting its planning goals, the university knew enough not to follow a method that would result only in plans well written, then shelved until the next planning cycle. Although the discipline of documentation forces some serious thinking about objectives and resources and encourages communication, these benefits were insufficient for the university, which wanted a plan for making the heartrending decisions on the operating budget. The plan had to be strong enough to prevent the sacrifice of long-range goals to meet short-range exigencies.

In reviewing its resources, objectives, and planning problems, the university soon recognized that it could not do everything at once. It had no choice but to think of planning as a process and to draw a road map.

The normal place to start on a road to anywhere is at the beginning: in the case of planning, with an analysis of environment and a determination of objectives. Since the university was determined to use the budget cycle as an immediate test of its planning and as a tool for implementation, it had no time to start with an analysis of external factors. The planning began with objectives.

Immediate objectives

The university set as its immediate goals: (1) critical impact on the budget process in 1972; (2) development of objectives from top down and bottom up; and (3) groundwork to develop a complete planning, programming, budgeting system. The system would be open so faculty, as well as administration, would know what planning was and feel part of it. The system would also emphasize the economic development of a management information data base, modular in concept so it would grow with the development of PPBS and provide the basis of a management information system, as distinguished from an operating information system (to pay bills, write payroll checks, register students, and keep the university house functioning).

The university met these goals in part in spring 1972 without exciting serious opposition from faculty, administrators, or the university as a whole.

In preparing the FY 1973 operating budget, the university used its "1972–77 Numerical Guide to Long-Range Planning" and university and academic department objectives to measure past performance of departments and evaluate their financial requests for the coming year. Those departments whose budget requests did not reflect concern with long-range goals did not fare well when compared with those departments that demonstrated consciousness of objectives.

The university used four major tools in its move toward PPBS, a system that in its present state at Utah emphasizes planning and budgeting: (1) development of pilot plans in selected departments; (2) environment analysis; (3) an embryo management information system that included classification and aggregation of management information according to the WICHE program classification system, the WICHE-designed resource requirements prediction model, the university's own projection pro-

[14] Leo Kornfield, "Three University Case Studies Show Varying Levels of Sophistication with All Systems Go for MIS," *College and University Business*, March 1971, p. 33.

gram, and a program for "crosswalking" from a program budget to the orthodox activity/object-oriented budget required by the state; and (4) objective setting from top and bottom.

The university analysts worked with department chairmen to make four pilot plans. In essence, the analysts wore two hats: As one told a department chairman, "Today, my job is to help you write as sound and 'salable' a plan as I can. If I do my job and analysis well here, I won't be able to attack the plan when I put on my other hat to analyze one program against another, except as yours relates in effectiveness to other programs. Your plan will be internally consistent and sound."

The pilot programs provided the analysts with important knowledge about the decision-making process, a "feel for the data" in the university, rapport with the faculty, and the "enrichment index" as a tool to measure and express resource allocation.

Enrichment index

Enrichment, as a measure of the percentage of annual change in financial resources per some unit of output, was the primary tool used to measure resource allocation in preparing the FY 1973 operating budget. It provided several benefits in analyzing objectives and performance and in reviewing budget requests.

The historical evaluation of enrichment forced top-level administrators and deans of colleges to analyze their past procedures for allocating resources: Had they put money where their priorities were? Or had they followed the too-easy-and-often-used pattern of giving incremental increases from year to year without considering student growth, future job markets, public service, or educational performance, as Dilley notes is often the case?

The deans were given a table showing how they had distributed resources to their departments to help them evaluate their priorities. The president, provost, and academic vice president received the same table, plus others that showed how the colleges ranked in order of cost per student. Enrichment analysis showed the distribution of budget by salary, change in student-faculty ratios, and support (supplies, travel, secretarial help, and so on).

Administrators and deans, in general, were satisfied that resources had been distributed in order of priorities. However, there were some surprises. One college and one department had reaped significant enrichment because of declining enrollments. In the department, the university was committed by grants and personal assurances to the enrichment, though none but the department chairman had been fully aware of how "rich" it was, since enrollment had declined, rather than grown as originally forecast. The college is reorganizing itself to be more responsive to societal needs, a move that could have an important effect on enrollment.

In two other cases, colleges had been significantly underenriched because student population had grown extensively. The administration in at least one case had not intended that the underenrichment would reach the proportions it did. In the other case, the administration emphasized the need to control student growth through [illegible] since quality of graduates entering a tight job market was deteriorating because of inadequate resources.

Facilitating communication

The enrichment index encouraged meaningful communication in several ways. In reinstituting planning with an eye toward PPBS, the administration set as major objectives improved communication, decentralized decision making where possible, and innovation—which, after all, means allowing for risk and error, as well as selecting creative thinkers and doers.

The Academic and Financial Planning Office and the administration spent considerable time and effort in explaining and demonstrating that they considered the enrichment index only an indicator, not a measure of resource needs. In the preface to the "Numerical Guide," the systems analysts noted that quantitative information, such as enrichment, is "only one of the vehicles for (planning)..... Qualitative variables are as important, if not more so, than the measurements presented here. Deans must also deal with the priorities of

society, the university colleges, departments, students, and faculty."

Enrichment provided a means for deans to relate special programs to resource requirements. For example, deans and others proposed experimental programs in such terms as "We request a given percentage or given dollar amount of enrichment for one, two, or three years (depending on the program) to build a base."

The index allowed the planning office to correlate—admittedly in rough form—output measures, other than students or student credit hours, with input measures and, thus, provided a first step in evaluating past performance and focusing attention on future outputs.

Management information

Enrichment analysis as a step toward cost-benefit analysis could not have been accomplished if the Academic and Financial Planning Office had not started to develop a PPBS modeled on the seven major programs identified by WICHE. The University of Utah, as a pilot institution testing the WICHE model, had set out to build a management information data base for all programs, rather than solely for instruction. Thus, it laid the groundwork for developing a complete management information system, as distinguished from a management information system data base or an automated operating information system for housekeeping chores. The university found that it still had a good operating information system, but that its information had to be aggregated at considerable expense. The impetus and structure provided by the challenge of program classification, obtaining historical perspective, and relating output to input encouraged careful design of a data base that will eventually be automatically updated by the operational system as it performs its housekeeping.

The major element in planning is objective or goal setting, not collection of financial input and output data or their analyses for decision making. The difficulty in setting objectives is not limited to universities. Charles Steetz has pointed out that too often government programs become operational without planning and objective identification. Almost any good text on business management or employee supervision emphasizes objective or goal setting, but businesses are still running inefficiently and employees are still performing ineffectively and unhappily because goals are undefined.

The pilot studies showed that department chairmen were no different from other men, for they almost inevitably wanted to talk about means and data analysis rather than objectives or goals.

As a result of its pilot experiences, the Academic and Financial Planning Office provided specific guidance when it sought objectives from each college. First, the office furnished the university objectives in brief form as a sample, noting that the ideas or concepts could be modified or augmented by the dean's objectives. Second, it provided enrollment projections for each college and asked that the deans modify these enrollments on the basis of their personal projections and, more importantly, their stated objectives. Third, the deans were not asked to plan but simply to set objectives. They were promised the opportunity for detailed [illegible] after the objectives had been negotiated. Fourth, they were asked to set objectives in terms so performance could be measured; and, since little was known about measuring educational outputs, they were provided the opportunity to define the way they would like to be measured.

Using planning inputs

As a result of long-range planning in 1971–72, which consisted of objective setting by university administration, deans, and department chairmen, enrichment analysis, and program identification, the Academic and Financial Planning Office in spring 1972 was prepared to participate intensively in the development of the operating budget.

From the enrichment analysis and projections summarized in the "Numerical Guide," the office prepared a "Budget Decision Guide" that included specific recommendations based on an analysis of enrichment, quality of objective setting by colleges and departments, projected job market opportunities, projected enrollments, key university objectives, and student evaluations of

departments. The student evaluations were of no use as they tended to group at the median of the scale, and no correlation could be found with student/faculty ratios or other proposed measures of input or output, including the perceptions of top- and second-level administration.

The "Budget Decision Guide" proposed short- and long-term actions for enriching lower division offerings by shifting resources currently devoted to marginal graduate programs, or by limiting enrollment so both quality and output would be more compatible with projected demand. The guide also recommended gradually eliminating substandard programs with low job demand. It related departmental performances to cost per student, evaluated graduate programs, detailed projected manpower demand, and evaluated the colleges' objective setting.

This guide was not intended to make decision making a matter of rote. It provided a base from which to evaluate budget requests and to test the seriousness and realism of college objectives. In at least one case, it was the vehicle for adjusting previous commitments to the development of a department when analysis showed that the original planning data on enrollment growth and societal need were not panning out. The analysis of this particular department was a success in two ways: it showed the need to redirect resources, and it accomplished the redirection so that the department chairmen did not think the resulting lengthened commitment was a matter of whim.

Importance of involvement

Testing the long-range plan in the heat of budget decision making demonstrated that emphasis to involve all levels in planning and objective setting had been well placed. Because all levels were involved from the beginning and issues were developed progressively, the university did not see analysis as a threat. The institutional system was not even upset with the enrollment index which, as an indicator, could have wreaked havoc with organizational morale if improperly used. The index was probably received as it was because analysts and administrators continually emphasized that value judgments carried much more weight than indicators. Faculty perceived that the university's top executives had a healthy suspicion of the "black magic" sometimes provided by indicators.

A comparison of previous university plans and their uses in decision making with the current plan and its use proved the importance of setting forth issues and alternatives in succinct formats.

A review of the experience of the University of Utah and other institutions and agencies demonstrates that the road to full-scale and effective PPBS is not easy. Emphasis in PPBS, previously on developing management information systems and assigning costs, is now shifting to defining and quantifying output measures.

The university took advantage of previous [illegible] and did some work of its own. However, its experience suggests that the real problem in implementing PPBS is not one of mechanism, but one of agreement on the value of outputs. Such an agreement does not necessarily rest on developing ideal measures. Few will agree with a measure, no matter how well quantified, that threatens a cherished program. More important than the quantifying of outputs may be the communication of objectives and the negotiations that goes into setting objectives and output measures, whether they are quantified or are simply the qualitative opinions of concerned, intelligent, and sincere administrators. □